

Nicotine on Coronary Blood Flow. In this section on Coronary Blood Flow, the effects of cigarette smoking or nicotine injection on canine or human subjects are described together, ignoring the differences between them. After describing the conclusion of (126) Leb et al., a concept is described which states that nicotine increases cardiac work directly, which may in turn induce the release of catecholamines. Leb et al. did not propose such a scheme and nobody else has until the appearance of the 1971 document.

Our results show that myocardial oxygen consumption increases after nicotine administration; this occurs as left ventricular work rises. It was shown previously that nicotine augments the contractile state of the myocardium (Puri et al., 1968). The increase in myocardial oxygen consumption is expected, since the drug augments the contractile state of the heart and cardiac work (Sonnenblick et al., 1963). As a result, the increase in myocardial oxygen demands are met by an increase in the effective coronary flow. Figure 1 shows that capillary flow increases almost proportionally to myocardial oxygen consumption, whereas the increase in total coronary flow is far in excess of myocardial oxygen consumption; this suggests that effective capillary flow measured by this method is more closely related to myocardial oxygen consumption than is total coronary flow.

The results reported here do not permit any conclusions on the exact location of the action of nicotine. It is possible that nicotine, like norepinephrine, decreases coronary vascular resistance (Winbury et al., 1965); this could increase effective coronary flow up to a limit, above which there cannot take place any further rise in effective capillary flow as total coronary flow increases. Only direct observations on the microcirculation similar to those carried out by Wayland et al. (1967) will permit more definitive conclusions on this point.

CONCLUSIONS. Intravenous administration of nicotine (160 $\mu\text{g/kg}$ in one minute) in the healthy, closed-chest, anesthetized dog caused increases in left ventricular work, in myocardial oxygen consumption and in both effective (nutritional) and total coronary flow.

The increase in effective capillary flow to the myocardium after nicotine administration was sufficient to meet myocardial oxygen demands. Effective capillary flow appeared to be primarily regulated by myocardial oxygen consumption. The proportional increase in myocardial oxygen consumption and effective capillary flow indicates that the effective capillary flow to the myocardium is closely related to myocardial oxygen supply.

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